3/7/2006 10:17:22 AM
3/7/2006 10:43:09 AM

[File 344] Chinese Patents Abs Jan 1985-2006/Jan
[File 347] JAPIO Nov 1976-2005/Sep(Updated 060103)
[File 350] Derwent WPIX 1963-2006/UD,UM &UP=200607
[File 371] French Patents 1961-2002/BOPI 200209

Set	Items	Description
S1	46761	S MAGNETIC(3N)RESONA????? OR MRI? ? OR MAGNETIC()RESONANCE()IMAG???? OR MR(3N)IMAG???? OR MAGNETIC(3N)IMAG???? OR NMR? ? OR NUCLEAR()MAGNETIC OR FTNMR? ? OR FTMRI? ? OR MAGNETORESONA???? OR PMR? ? OR PROTON()MAGNETIC()RESONA???? OR PARAMAGNETIC(3N)RESONA???? OR MAGNETIC(3N)RELAX????? OR FERROMAGNETIC(3N)RESONA???? OR MAGNETIC(3N)(SPECTRO???????) OR MRA? ? OR MAGNETIC()RESONANCE()ANGIOGRAPH????
S2	165757	S (SPIN????()SPIN???? OR T2 OR T()2 OR TRANSVERS????? OR PREPAR?????? OR WEIGH?????)(3N)(SIGNAL??? OR SEQUENC?????? OR SERIES OR PULS?????? OR TRAIN????? OR IMAG???? OR PERIOD???? OR TIME OR TIMING OR PHAS???? OR CYCL???? OR FREQUENC???? OR CONTRAST????) OR CONTRAST?????(3N)(SIGNAL???? OR SEQUENC?????? OR SERIES OR PULS?????? OR TRAIN????? OR IMAG???? OR PERIOD???? OR TIME OR TIMING OR PHAS???? OR CYCL???? OR FREQUENC???? OR CONTRAST????)
S3	246330	S 2D OR 3D OR (TWO OR THREE)(3N)DIMENSION????? OR NAVIGAT?????(3N)(SIGNAL???? OR SEQUENC?????? OR SERIES OR PULS?????? OR TRAIN????? OR IMAG???? OR PERIOD???? OR TIME OR TIMING OR PHAS???? OR CYCL???? OR FREQUENC???? OR CONTRAST????) OR 2D()NAVIGAT???()RESTOR???()SEQUENCE??? OR RESTOR?????(3N)(SIGNAL???? OR SEQUENC?????? OR SERIES OR PULS?????? OR TRAIN????? OR IMAG???? OR PERIOD???? OR TIME OR TIMING OR PHAS???? OR CYCL???? OR FREQUENC???? OR CONTRAST????)
S4	1429980	S IMAG????(3N)(SIGNAL???? OR SEQUENC?????? OR SERIES OR PULS?????? OR TRAIN????? OR IMAG???? OR PERIOD???? OR TIME OR TIMING OR PHAS???? OR CYCL???? OR FREQUENC???? OR CONTRAST????) OR TURBO(3N)(SIGNAL???? OR SEQUENC?????? OR SERIES OR PULS?????? OR TRAIN????? OR IMAG???? OR PERIOD???? OR TIME OR TIMING OR PHAS???? OR CYCL???? OR FREQUENC???? OR CONTRAST????) OR TFE? ? OR TFE()EPI
S5	4106	S RELAX??????(3N)(SIGNAL???? OR SEQUENC?????? OR SERIES OR PULS?????? OR TRAIN????? OR IMAG???? OR PERIOD???? OR TIME OR TIMING OR PHAS???? OR CYCL???? OR FREQUENC???? OR CONTRAST????)
S6	45615	S IC=(G01R-003/56 OR G01V-003/00 OR G01N-024/08 OR G01V-003/75 OR G01R-033/56F OR A61B-005/055 OR G01R-033/34 OR G01R-033/20 OR G01R-033/54 OR G01R-033/36 OR G01V-003/00)
S7	14604	S MC=(S01-E02A OR S01-H05 OR S03-E07A OR S01-E02A2 OR S01-E02A8A OR S01-E02A1 OR S03-E07C OR S03-E07A OR S05-D02B1 OR S05-D02B2 OR S03-C02F1 OR W02-B10 OR S05-D02B)
S8	16	S S1 AND S2 AND S3 AND S4 AND S5
S9	15	S S8 AND PY<=2002
S10	289	S S1 AND S2 AND S3
S11	47	S S10 AND ((MEASUR???? OR RECONSTRUCT???? OR REPAIR????)(3N)IMAG????)
S12	10	S S11 AND (HOMOGENOUS OR UNIFORM???? OR STEAD???? OR CONSTANT???)
S13	8	S S12 AND PY<=2002
S14	207	S S10 AND S6
S15	120	S S14 AND S7
S16	236	S S1 AND S2 AND S3 AND S4
S17	183	S S16 AND S6
S18	110	S S17 AND S7
S19	26	S S16 AND (HOMOGENOUS OR UNIFORM???? OR STEAD???? OR CONSTANT???)
S20	22	S S19 AND S6
S21	12	S S20 AND S7
S22	11	S S21 AND PY<=2002
S23	13602	S S3 AND (HOMOGENOUS OR UNIFORM???? OR STEAD???? OR CONSTANT???)
S24	140	S S23 AND ((MEASUR???? OR RECONSTRUCT???? OR REPAIR????)(3N)IMAG????)
S25	2	S S24 AND CONTRAST(3N)ENHANC?????
S26	40	S S24 AND S6
S27	25	S S26 AND S7
S28	20	S S27 AND PY<=2002
S29	7	S S13 NOT S25
S30	7	IDPAT (sorted in duplicate/non-duplicate order)
S31	7	IDPAT (primary/non-duplicate records only)
S32	4	S S22 NOT (S13 OR S25)
S33	13	S S9 NOT (S13 OR S22 OR S25)

3/7/2006 10:17:22 AM
3/7/2006 10:43:09 AM

S34 13 S S28 NOT (S9 OR S13 OR S22 OR S25)

11/9/2 (Item 2 from file: 155) **Links**
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14066733 **PMID:** 11836780
Sodium T2* relaxation times in human heart muscle.

Pabst Thomas; Sandstede Joern; Beer Meinrad; Kenn Werner; Neubauer Stefan; Hahn Dietbert
Insititut fur Rontgendiagnostik, Universitat Wurzburg, Germany. pabst@roentgen.uni-wuerzberg.de
Journal of magnetic resonance imaging - JMRI (United States) Feb **2002** , 15 (2) p215-8 , **ISSN:** 1053-1807 **Journal Code:** 9105850
Publishing Model Print
Document type: Evaluation Studies; Journal Article
Languages: ENGLISH
Main Citation Owner: NLM
Record type: MEDLINE; Completed
Subfile: INDEX MEDICUS
PURPOSE: To determine sodium transverse relaxation (T2*) characteristics for myocardium, blood and cartilage in humans. METHODS: T2* measurements were performed using a **3D ECG**-gated spoiled gradient echo sequence. A 1.5 Tesla clinical scanner and a 23Na heart surface coil were used to examine eight healthy volunteers. In biological tissue, the sodium 23 nucleus exhibits a two-component T2 relaxation due to the spin 3/2 and its quadrupolar nature. The long T2* components of normal myocardium, blood, and cartilage were quantified. For myocardium, the T2* was determined separately for the septum, anterior wall, lateral wall, and posterior wall. RESULTS: The long **T2* relaxation time** components of 13.3 +/- 4.3 msec (septum 13.9 +/- 3.2 msec, anterior wall 13.8 +/- 5.4 msec, lateral wall 11.4 +/- 4.1 msec, posterior wall 14.1 +/- 3.7 msec), 19.3 +/- 3.3 msec, and 10.2 +/- 1.6 msec, were significantly different for myocardium, blood, and cartilage, respectively ($P < 0.00001$, Friedman's ANOVA). CONCLUSION: Measurement of 23Na T2* relaxation times is feasible for different regions of the human heart muscle, which might be useful for the evaluation of cardiac pathologies. Copyright 2002 Wiley Liss, Inc.
Tags: Comparative Study; Female; Male; Research Support, Non-U.S. Gov't
Descriptors: ***Magnetic Resonance Imaging**--methods--MT; *Myocardium --metabolism--ME ; Adult; Blood--metabolism--ME; Cartilage--metabolism--ME; Electrocardiography; Humans; Signal Processing, Computer-Assisted; Sodium --metabolism--ME
CAS Registry No.: 7440-23-5 (Sodium)
Record Date Created: 20020211
Record Date Completed: 20020321

11/9/3 (Item 1 from file: 95) Links
Fulltext available through: USPTO Full Text Retrieval Options
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01005472 F96076075975
Fast RARE MR imaging with variable flip angle excitation

(Schnelle RARE-**MRI** mit variabler Flipwinkelanregung)
Miyati, T; Kasai, H; Shundo, H; Imazawa, M; Banno, T; Ohba, S; Itakawa, K; Hirose, Y
Nagoya City Univ.
RadioGraphics, v16, n3, pp595-602 , **1996**
Document type: journal article **Language:** English
Record type: Abstract
ISSN: 0271-5333

Abstract:
A method was developed for performing T1-**weighted magnetic resonance imaging** with the rapid acquisition with **relaxation** enhancement (RARE) **sequence** by altering the excitation flip angle. This method was called variable flip angle turbo spin-echo (VF-TSE) **imaging**. When the effective echo time corresponds to the first echo, the resolution worsens as the echo train length becomes longer. For this reason, the echo train length was set at three, the repetition time (TR) was shortened (100 - 200 msec) to decrease **imaging time**, and the initial flip angle was adjusted (120 deg - 140 deg) to improve **image** quality. Another advantage of this method is that the initial flip angle can be reduced to below 90 deg when a longer TR is needed. Measured signal intensities for VF-TSE **imaging** matched theoretic predictions. VF-TSE **imaging** yielded high **contrast**-to-noise and **signal**-to-noise ratios without sacrificing resolution. The VF-TSE technique was useful for breath-hold, **three-dimensional**, and cardiac synchronization **imaging** .

Descriptors: CEREBROSPINAL FLUID; DIAGNOSTIC VALUE; **MAGNETIC** RESONANCE **IMAGING**; LUNG; RECOVERY **TIME**; **IMAGE** QUALITY; **IMAGE CONTRAST**; **3D IMAGING**; APNEA; **ECG** GATING; CARDIAC ACTIVITY
Identifiers: MR-Imaging; variabler Anregungswinkel; Bildguete

11585789 **EMBASE No:** 2002157420

Pulsed Z-spectroscopic imaging of cross-relaxation parameters in tissues for human MRI: Theory and clinical applications

Yarnykh V.L.
Dr. V.L. Yarnykh, Department of Radiology, University of Washington, Box 357115, Seattle, WA 98195 United States
Author Email: yarnykh@u.washington.edu
Magnetic Resonance in Medicine (MAGN. RESON. MED.) (United States) 2002 , 47/5 (929-939)
CODEN: MRMEE **ISSN:** 0740-3194
Document Type: Journal ; Article
Language: ENGLISH **Summary Language:** ENGLISH
Number Of References: 26

A new method of **pulsed** Z-spectroscopic **imaging** is proposed for in vivo visualization and quantification of the parameters describing cross-relaxation between protons with liquid-like and solid-like relaxation properties in tissues. The method is based on analysis of the magnetization transfer (MT) effect as a function of the offset frequency and amplitude of a pulsed off-resonance saturation incorporated in a spoiled gradient-echo **MRI** pulse sequence. The theoretical concept of the method relies on an approximated analytical model of pulsed MT that provides a simple three-parameter equation for a pulsed **steady**-state Z-spectrum taken far from resonance. Using this model, the parametric **images** of cross-**relaxation** rate **constant**, content, and TSUB2 of the semisolid proton fraction can be reconstructed from a **series** of MT- **weighted images** and a coregistered TSUB1 map. The method was implemented on a 0.5 T clinical **MRI** scanner, and it provided high-quality **3D** parametric maps within an acceptable scanning time. The estimates of cross-relaxation parameters in brain tissues were shown to be quantitatively consistent with the literature data. Clinical examples of the parametric **images** of human brain pathologies (multiple sclerosis and glioma) demonstrated high tissue **contrast** and clear visualization of the lesions. (c) 2002 Wiley-Liss, Inc.

Device Brand Name/Manufacturer Name: Tomikon S50/Bruker/Germany
Device Manufacturer Names: Bruker/Germany
MEDICAL DESCRIPTORS:
* diagnostic **imaging**; ***spectroscopy**; ***nuclear magnetic resonance imaging**
proton transport; magnetism; molecular model; **image reconstruction**; brain tissue; **image** quality; multiple sclerosis--diagnosis--di; glioma--diagnosis--di; **contrast** enhancement; mathematical model; mathematical analysis; **image** processing; **image** analysis; human; case report; controlled study; adult; article
Section Headings:
014 Radiology
027 Biophysics, Bioengineering and Medical Instrumentation

24/9/2 (Item 1 from file: 95) **Links**
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01189413 F98030210974
Optimal MR cholangiopancreatographic sequence and its clinical application

(Optimale Sequenz der MR-Cholangiopankreatographie und deren klinische Anwendung)
Irie, H; Honda, H; Tajima, T; Kuroiwa, T; Yoshimitsu, K; Makisumi, K; Masuda, K
Kyushu Univ., Fukuoka, J
Radiology, v206, n2, pp379-387 , 1998
Document type: journal article **Language:** English
Record type: Abstract
ISSN: 0033-8419

Abstract:
The purpose of the study was to determine the appropriate acquisition parameters for **magnetic resonance** cholangiopancreatography (MRCP) with a half-Fourier rapid acquisition with **relaxation** enhancement (RARE) **sequence**; to determine the optimal MRCP technique by comparing half-Fourier RARE, **steady**-state free precession (SSFP), **two-dimensional** (**2D**) fast spin-echo (SE), and **three-dimensional** (**3D**) fast SE sequences; and to clarify the usefulness and limitations of MRCP in diagnosing pancreatic abnormalities. Half-Fourier RARE MRCP **images** with varying parameters were compared by using a phantom. Duct conspicuity and **contrast** -to-noise ratios (C/Ns) were compared for the four MRCP techniques in a phantom and healthy volunteers. The optimal MRCP technique was used to study healthy volunteers and clinical cases. Receiver operating characteristic (ROC) curves were created for data analysis. A 5-mm-thick section without intersection gap was appropriate for half-Fourier RARE MRCP. Only half-Fourier RARE MRCP could depict a 1-mm duct. C/N was the highest with half-Fourier RARE, followed by **3D** fast SE, and SSFP sequences. ROC curve analysis revealed no interobserver differences, and the area under the curve for detection of strictures of the main pancreatic duct was as high as 0.89. Half-Fourier RARE MRCP has the highest **contrast** and spatial resolution among the four techniques studied and may play an important role in diagnosing pancreatic abnormalities.

Descriptors: **MAGNETIC RESONANCE ANGIOGRAPHY**; PANCREAS; SPIN ECHO METHOD; PULSE SEQUENCE; FOURIER ANALYSIS; S N RATIO; **IMAGE** QUALITY; **IMAGE** ASSESSMENT; RECEIVER OPERATING CHARACTERISTICS; RECOVERY **TIME**; **3D IMAGING**; **IMAGE CONTRAST**; **IMAGE** RESOLUTION; **IMAGE** DEFINITION; CHOLANGIOGRAPHY; **MEASURED** DATA PROCESSING
Identifiers: MR-Cholangiographie; Pankreas; Halb-Fourier-Datenerfassung

25/9/3 (Item 3 from file: 2) **Links**
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06023221 **INSPEC Abstract Number:** A9518-0758-008
Title: Model-based maximum-likelihood estimation for phase- and frequency -encoded magnetic-resonance-imaging data
Author Miller, M.I.; Schaewe, T.J.; Bosch, C.S.; Ackerman, J.J.H.
Author Affiliation: Dept. of Electr. Eng., Washington Univ., St. Louis, MO, USA
Journal: Journal of Magnetic Resonance, Series B vol.107, no.3 p. 210-21

Publication Date: June 1995 **Country of Publication:** USA
ISSN: 1064-1866
U.S. Copyright Clearance Center Code: 1064-1866/95/$6.00

Language: English **Document Type:** Journal Paper (JP)
Treatment: Practical (P); Theoretical (T)
Abstract: A maximum-likelihood (ML)-based **magnetic-resonance- imaging (MRI) reconstruction** algorithm is established, based on frequency- and phase-encoded data. The model on which the ML method is based is a superposition of exponentially decaying, sinc-modulated sinusoids, arising from the basic Bloch equations for MR spectroscopy, modified to account for the distribution of resonance frequencies and phases used for spatial localization in the **image** field. Spatial-localizing gradients are assumed to be known linear functions of spatial coordinate position, with the x-encode (frequency) gradient applied continuously during the full duration of data collection, and the y-encode (phase) gradient applied during varying time periods before data collection. A single-voxel emitter becomes sinc-modulated in the x, y directions at rates proportional to voxel size and gradient strengths in the x-encode and y-encode directions. The full **two- dimensional MRI** signal becomes a superposition of sinc-modulated, exponentially decaying, single-sinusoid emitters, one for each voxel. The ML estimation of spin-density and **spin-spin relaxation** decay **time images** becomes a nonlinear least-squares optimization problem; it is solved using an iterative expectation-maximization algorithm for estimating multiple modulated sinusoids in noise. Phantom studies are presented, demonstrating the accuracy of the model and the application of the algorithm to spin-density and **spin**-spin **relaxation** decay **time** profiles. (14 Refs)
Subfile: A
Descriptors: biomedical **NMR**; iterative methods; least squares approximations; **NMR imaging**; optimisation
Identifiers: model-based maximum-likelihood estimation; **phase**-encoded **magnetic-resonance-imaging** data; **frequency** -encoded **magnetic-resonance-imaging** data; reconstruction algorithm; exponentially decaying sinc-modulated sinusoids; Bloch equations; spatial localization; spatial coordinate position; time periods; single-voxel emitter; spin-density **relaxation** decay **time images**; **spin-spin relaxation** decay **time images**; nonlinear least-squares optimization problem; iterative expectation-maximization algorithm; multiple modulated sinusoids; phantom studies
Class Codes: A0758 (Magnetic resonance spectrometers, auxiliary instruments and techniques); A8740 (Biomagnetism); **A8760I** (Medical magnetic resonance imaging and spectroscopy); A0260 (Numerical approximation and analysis
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08570286 **INSPEC Abstract Number:** A2003-09-8760I-013, B2003-05-7510N-012, C2003-05-7330-059

Title: Image-based finite element modeling of hemodynamics in stenosed carotid artery

Author Cebral, J.R.; Lohner, R.; Soto, O.; Choyke, P.L.; Yim, P.J.
Author Affiliation: Sch. of Computational Sci., George Mason Univ., Fairfax, VA, USA

Journal: Proceedings of the SPIE - The International Society for Optical Engineering **Conference Title:** Proc. SPIE - Int. Soc. Opt. Eng. (USA) vol.4683 p. 297-304
Publisher: SPIE-Int. Soc. Opt. Eng ,
Publication Date: 2002 **Country of Publication:** USA
CODEN: PSISDG **ISSN:** 0277-786X
SICI: 0277-786X(2002)4683L.297:IBFE;1-T
Material Identity Number: C574-2002-236
U.S. Copyright Clearance Center Code: 0277-786X/02/$15.00
Conference Title: Medical Imaging 2002: Physiology and Function from Multidimensional Images
Conference Sponsor: SPIE
Conference Date: 24-26 Feb. 2002 **Conference Location:** San Diego, CA, USA

Language: English **Document Type:** Conference Paper (PA); Journal Paper (JP)
Treatment: Theoretical (T)

Abstract: A methodology to construct patient-specific, anatomically and physiologically realistic finite element models of blood flows in stenosed carotid arteries is presented. Anatomical models of carotid arteries with stenosis are reconstructed from **contrast-enhanced magnetic resonance angiography (MRA) images** using a tubular deformable model along each arterial branch. A surface-merging algorithm is used to create a watertight model of the carotid bifurcation for subsequent finite element grid generation. A fully implicit scheme is used to solve the incompressible Navier-Stokes equations on unstructured grids in **three-dimensions**. Physiologic boundary conditions are derived from cine **phase-contrast MRA** flow velocity measurements at two locations below and above the bifurcation. The methodology was tested on image data of a patient with carotid artery stenosis. A finite element grid was successfully generated from **contrast-enhanced MRA images**, and pulsatile blood flow visualizations were produced. Visualizations of the wall shear stress distribution and of changes in both its magnitude and direction were produced. These quantities may become important in order to characterize healthy and diseased flow and wall shear stress patterns. We conclude that **MRA** can be used to obtain all the anatomical and physiologic data necessary for realistic modeling of blood flows in carotid arteries with stenosis. Our results confirm that image-based computational fluid dynamics techniques can be applied to the modeling of hemodynamics in carotid arteries with stenosis. These capabilities may be used to advance our understanding of the generation and progression of vascular disease, and may eventually allow physicians to enhance current image-based diagnosis, and to predict and evaluate the outcome of interventional procedures non-invasively. (24 Refs)

Subfile: A B C
Descriptors: biomedical **MRI**; blood vessels; computational fluid dynamics; diseases; finite element analysis; haemodynamics; image enhancement; **image reconstruction**; medical image processing; Navier-Stokes equations; physiological models; pulsatile flow
Identifiers: surface-merging algorithm; watertight model; fully implicit scheme; incompressible Navier-Stokes equations; unstructured grids; diseased flow; healthy flow; vascular disease progression; wall shear stress distribution visualizations; image-based computational fluid dynamics techniques; finite element grid; physiologic boundary conditions; **contrast- enhanced MRA images**
Class Codes: A8760I (Medical magnetic resonance imaging and spectroscopy); A8745H (Haemodynamics, pneumodynamics); A8710 (General, theoretical, and mathematical biophysics); A8770E (Patient diagnostic methods and instrumentation); A8740 (Biomagnetism); **B7510N** (Biomedical magnetic resonance imaging and spectroscopy); B6135 (Optical, image and video signal processing); C7330 (Biology and medical computing); C5260B (Computer vision and image processing

27/9/2 (Item 2 from file: 2) **Links**
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08466404 **INSPEC Abstract Number:** A2003-01-8760I-043, B2003-01-7510N-039, C2003-01-7330-263
Title: More reliable noninvasive, visualization of the cerebral veins and dural sinuses: comparison of three MR angiographic techniques
Author Kirchhof, K.; Welzel, T.; Jansen, O.; Sartor, K.
Author Affiliation: Dept. of Neuroradiol., Heidelberg Univ., Germany
Journal: Radiology vol.224, no.3 p. 804-10
Publisher: Radiol. Soc. North America ,
Publication Date: Sept. 2002 **Country of Publication:** USA
CODEN: RADLAX **ISSN:** 0033-8419
SICI: 0033-8419(200209)224:3L.804:MRNV;1-3
Material Identity Number: R223-2002-009

Language: English **Document Type:** Journal Paper (JP)
Treatment: Practical (P); Experimental (X)
Abstract: The authors compared the visualization of cerebral veins and dural sinuses at **contrast** material-**enhanced three-dimensional (3D)** fast low-angle shot (FLASH) **magnetic resonance** (MR) angiography, time-of-flight (TOF) MR angiography, and **phase- contrast** MR angiography. They prospectively compared the **two- dimensional** source **images**, multiplanar **reconstructed images**, and maximum intensity projection angiograms obtained at **contrast-enhanced 3D** radio-**frequency**-spoiled FLASH MR angiography in 20 patients with those obtained at TOF and **phase-contrast** MR angiographic examinations. Two neuroradiologists in consensus determined the number of visualized cortical veins and graded the quality of visualization of veins and sinuses as intense and continuous, faint and continuous, or noncontinuous. Statistical analysis was performed with the nonparametric sign test and the Wilcoxon matched pairs sign rank test. The cortical veins, inferior sagittal sinus, and cavernous sinuses were visualized best with FLASH MR angiography ($P < .003$). The Trolard and Labbe veins were visualized equally well with the FLASH and TOF sequences. For septal, internal cerebral, and Rosenthal left basal vein visualization, **phase-contrast** MR angiography was inferior to the FLASH and TOF MR angiographic examinations ($P < .05$). The quality of visualization of the thalamostriate and Galen veins and of the superior sagittal, rectal, and transverse sinuses was the same at all MR angiographic examinations. In conclusion, **three- dimensional** FLASH MR angiography depicts some venous structures better than do TOF and **phase-contrast** MR angiographic examinations. The depiction of other veins is the same with **3D** FLASH and TOF sequences. (24 Refs)
Subfile: A B C
Descriptors: biomedical **MRI**; blood vessels; brain; image enhancement; **image reconstruction**; image sequences; medical image processing; statistical analysis
Identifiers: more reliable noninvasive visualization; cerebral veins; dural sinuses; medical diagnostic imaging; **magnetic resonance imaging** ; MR angiographic techniques comparison; thalamostriate veins; Labbe veins; **two-dimensional** source images; multiplanar **reconstructed images**; maximum intensity projection angiograms ; **contrast-enhanced 3D** radio-**frequency**-spoiled FLASH MR angiography; Galen veins; Wilcoxon matched pairs sign rank test
Class Codes: A8760I (Medical magnetic resonance imaging and spectroscopy); A8730 (Biophysics of neurophysiological processes); A8770E (Patient diagnostic methods and instrumentation); A8740 (Biomagnetism); **B7510N** (Biomedical magnetic resonance imaging and spectroscopy); B6135 (Optical, image and video signal processing); C7330 (Biology and medical computing); C5260B

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08459679 **INSPEC Abstract Number:** A2003-01-8760I-023, B2003-01-7510N-020, C2003-01-7330-066
Title: UNFOLD using a temporal subtraction and spectral energy comparison technique
Author Yijing Wu; Eun-Kee Jeong; Parker, D.L.; Alexander, A.L.
Author Affiliation: Dept. of Phys., Utah Univ., Salt Lake City, UT, USA
Journal: Magnetic Resonance in Medicine vol.48, no.3 p. 559-64
Publisher: Wiley ,
Publication Date: Sept. 2002 **Country of Publication:** USA
CODEN: MRMEEN **ISSN:** 0740-3194
SICI: 0740-3194(200209)48:3L.559:UUTS;1-R
Material Identity Number: K620-2002-009
U.S. Copyright Clearance Center Code: 0740-3194/02/$3.00

Language: English **Document Type:** Journal Paper (JP)
Treatment: Experimental (X)
Abstract: In dynamic **MRI**, several methods have been demonstrated to increase acquisition speed by decreasing the number of sequential phase encodings. The UNFOLD technique interleaves the measurements of k-space, **reconstructs** aliased **images** from each k-space interleaf, and applies a temporal low-pass filter to obtain the nonaliased images. However, low-pass filter resolution of the nonaliased images fails if there is overlap between the spatially aliased temporal spectra. In this study a subtraction method was used to remove the static portion of the image. The aliased and nonaliased dynamic portions are then resolved by comparing the temporal energy of bands in the power spectrum. This method was combined with the **3D** 2*2 UNFOLD (a factor of 2 interleaves in two directions) technique. The combination resulted in a factor of 4 improvement in acquisition speed. Application of this method to a **time**-resolved, **contrast-enhanced** flow phantom study is presented. (13 Refs)
Subfile: A B C
Descriptors: antialiasing; biomedical **MRI**; **image reconstruction**; image resolution; medical image processing
Identifiers: dynamic **MRI**; UNFOLD technique; sequential phase encodings; aliased **images reconstruction**; k-space interleaf; temporal low-pass filter; nonaliased images; **time**-resolved **contrast-enhanced** flow phantom; temporal frequency spectrum; temporal subtraction and spectral energy comparison; T-SUSPECT method; inverse Fourier transform
Class Codes: A8760I (Medical magnetic resonance imaging and spectroscopy); A8740 (Biomagnetism); A8770E (Patient diagnostic methods and instrumentation); **B7510N** (Biomedical magnetic resonance imaging and spectroscopy); B6135 (Optical, image and video signal processing); C7330 (Biology and medical computing); C5260B (Computer vision and image processing techniques
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27/9/4 (Item 4 from file: 2) **Links**
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08423440 **INSPEC Abstract Number:** A2002-23-8760I-028, B2002-12-7510N-015, C2002-12-7330-069
Title: Time-resolved contrast-enhanced imaging with isotropic resolution and broad coverage using an undersampled 3D projection trajectory
Author Barger, A.V.; Block, W.F.; Toropov, Y.; Grist, T.M.; Mistretta, C.A.
Author Affiliation: Dept. of Phys., Wisconsin Univ., Madison, WI, USA
Journal: Magnetic Resonance in Medicine vol.48, no.2 p. 297-305
Publisher: Wiley ,
Publication Date: Aug. 2002 **Country of Publication:** USA
CODEN: MRMEEN **ISSN:** 0740-3194
SICI: 0740-3194(200208)48:2L.297:TRCE;1-2
Material Identity Number: K620-2002-008
U.S. Copyright Clearance Center Code: 0740-3194/02/$3.00

Language: English **Document Type:** Journal Paper (JP)
Treatment: Practical (P); Experimental (X)
Abstract: Time-resolved **contrast-enhanced 3D** MR angiography (**MRA**) methods have gained in popularity but are still limited by the tradeoff between spatial and temporal resolution. A method is presented that greatly reduces this tradeoff by employing undersampled **3D** projection reconstruction trajectories. The variable density k-space sampling intrinsic to this sequence is combined with temporal k-space interpolation to provide time frames as short as 4 s. This time resolution reduces the need for exact **contrast timing** while also providing dynamic information. Spatial resolution is determined primarily by the projection readout resolution and is thus isotropic across the FOV, which is also isotropic. Although undersampling the outer regions of k-space introduces aliased energy into the image, which may compromise resolution, this is not a limiting factor in high-**contrast** applications such as **MRA**. Results from phantom and volunteer studies are presented demonstrating isotropic resolution, broad coverage with an isotropic field of view (FOV), minimal projection reconstruction artifacts, and temporal information. In one application, a single breath-hold exam covering the entire pulmonary vasculature generates high-resolution, isotropic imaging volumes depicting the bolus passage. (36 Refs)
Subfile: A B C
Descriptors: biomedical **MRI**; blood vessels; **image reconstruction**; image sampling; interpolation; lung; medical image processing
Identifiers: time-resolved **contrast-enhanced imaging**; isotropic resolution; broad coverage; undersampled **3D** projection trajectory; **3D MRI** angiography; variable density k-space sampling; temporal k-space interpolation; isotropic field of view; pulmonary vasculature; bolus passage; abdomen; thorax; image artifacts; breath-hold imaging
Class Codes: A8760I (Medical magnetic resonance imaging and spectroscopy); A8740 (Biomagnetism); A8770E (Patient diagnostic methods and instrumentation); A8745H (Haemodynamics, pneumodynamics); A0260 (Numerical approximation and analysis); **B7510N** (Biomedical magnetic resonance imaging and spectroscopy); B6135 (Optical, image and video signal processing); B0290F (Interpolation and function approximation (numerical analysis)); C7330 (Biology and medical computing); C4130 (Interpolation and function approximation (numerical analysis)); C5260B (Computer vision and image processing techniques
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27/9/5 (Item 5 from file: 2) **Links**
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08423439 **INSPEC Abstract Number:** A2002-23-8760I-027, B2002-12-7510N-014, C2002-12-7330-068
Title: Three-dimensional spiral MR imaging: application to renal multiphase contrast-enhanced angiography
Author Amann, M.; Bock, M.; Floemer, F.; Schoenberg, S.O.; Schad, L.R.
Author Affiliation: Deutsches Krebsforschungszentrum (DKFZ), Heidelberg, Germany
Journal: Magnetic Resonance in Medicine vol.48, no.2 p. 290-6
Publisher: Wiley ,
Publication Date: Aug. 2002 **Country of Publication:** USA
CODEN: MRMEEN **ISSN:** 0740-3194
SICI: 0740-3194(200208)48:2L.290:TDSI;1-M
Material Identity Number: K620-2002-008
U.S. Copyright Clearance Center Code: 0740-3194/02/$3.00

Language: English **Document Type:** Journal Paper (JP)
Treatment: Practical (P); Experimental (X)
Abstract: A fast MR pulse sequence with spiral in-plane readout and conventional **3D** partition encoding was developed for multiphase **contrast- enhanced magnetic resonance angiography** (CE-**MRA**) of the renal vasculature. Compared to a standard multiphase **3D** CE-**MRA** with FLASH readout, an isotropic in-plane spatial resolution of 1.4*1.4 mm/sup 2/ over 2.0*1.4 mm/sup 2/ could be achieved with a temporal resolution of 6 sec. The theoretical gain of spatial resolution by using the spiral pulse sequence and the performance in the presence of turbulent flow was evaluated in phantom measurements. Multiphase **3D** CE-**MRA** of the renal arteries was performed in five healthy volunteers using both techniques. A deblurring technique was used to correct the spiral raw data. Thereby, the off-resonance frequencies were determined by minimizing the imaginary part of the data in image space. The chosen correction algorithm was able to reduce image blurring substantially in all **MRA** phases. The image quality of the spiral CE- **MRA** pulse sequence was comparable to that of the FLASH CE-**MRA** with increased spatial resolution and a 25% reduced **contrast** -to-noise ratio. Additionally, artifacts specific to spiral **MRI** could be observed which had no impact on the assessment of the renal arteries. (23 Refs)
Subfile: A B C
Descriptors: biomedical **MRI**; blood vessels; image resolution; **image restoration**; kidney; medical image processing
Identifiers: 3D spiral **MRI**; renal multiphase **contrast- enhanced** angiography; flow artifacts; deblurring; fast pulse sequence; spiral in-plane readout; **3D** partition encoding; renal vasculature; off-resonance frequencies; image quality; reduced **contrast**-to-noise ratio; **image reconstruction**; FLASH sequence; spatial resolution
Class Codes: A8760I (Medical magnetic resonance imaging and spectroscopy); A8740 (Biomagnetism); A8770E (Patient diagnostic methods and instrumentation); **B7510N** (Biomedical magnetic resonance imaging and spectroscopy); B6135 (Optical, image and video signal processing); C7330 (Biology and medical computing); C5260B (Computer vision and image processing techniques
Copyright 2002, IEE

27/9/13 (Item 13 from file: 2) **Links**
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07597215 **INSPEC Abstract Number:** A2000-12-8760I-061, B2000-06-7510N-091
Title: Real-time MRI using gradient echoes
Author Riederer, S.J.; Busse, R.F.; Fain, S.B.; Kruger, D.G.
Author Affiliation: Magnetic Resonance Lab., Mayo Clinic, Rochester, MN, USA
Conference Title: Ultrafast Magnetic Resonance Imaging in Medicine. Proceedings of the International Symposium on Ultrafast Magnetic Resonance Imaging in Medicine p. 103-9
Editor(s): Naruse, S.; Watari, H.
Publisher: Elsevier Science , Amsterdam, Netherlands
Publication Date: 1999 **Country of Publication:** Netherlands xiv+357 pp.
ISBN: 0 444 50280 7 **Material Identity Number:** XX-2000-00389
Conference Title: Proceedings of the International Symposium on Ultrafast Magnetic Resonance Imaging in Medicine
Conference Date: 27-29 Jan. 1999 **Conference Location:** Kyoto, Japan

Language: English **Document Type:** Conference Paper (PA)
Treatment: Experimental (X)
Abstract: Real-time **magnetic resonance imaging** (**MRI**) techniques can be used for direct diagnosis, setup of a diagnostic sequence, and monitoring a separate process. The elements of real-time **MRI** are a rapid and continuously run pulse sequence, real-time **image reconstruction**, and interactive sequence control. A 2DFT gradient echo approach allows robustness to off-resonance effects and flexible phase encode ordering. Image rates can approach 10 Hz. Proven applications include rapid localization and real-**time** triggering of **contrast-enhanced** MR angiograms. (15 Refs)
Subfile: A B
Descriptors: biomedical **MRI**; Fourier transform spectra; **image reconstruction**; medical image processing
Identifiers: real-time **magnetic resonance imaging** techniques; direct diagnosis; diagnostic sequence; rapid continuously run pulse sequence real-time **image reconstruction**; interactive sequence control; **two dimensional** Fourier transform gradient echo; off-resonance effect; flexible phase encode ordering; real-time triggering; **contrast-enhanced magnetic resonance** angiograms ; image rates
Class Codes: A8760I (Medical magnetic resonance imaging and spectroscopy); A8740 (Biomagnetism); A8770E (Patient diagnostic methods and instrumentation); **B7510N** (Biomedical magnetic resonance imaging and spectroscopy); B6135 (Optical, image and video signal processing

25/9/2 (Item 2 from file: 350) **Links**
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010034637 **Image available**
WPI Acc No: 1994-302350/199437
XRPX Acc No: N94-237632
Magnetic resonance imaging appts - subjects subject under examination placed in static magnetic field to RF pulse and gradient magnetic field to acquire echo signals and obtain MR image
Patent Assignee: TOSHIBA KK (TOKE)
Inventor: TOKUNAGA Y
Number of Countries: 001 Number of Patents: 001
Patent Family:

Patent No	Kind	Date	Applicat No	Kind	Date	Week	
US 5349295	A	19940920	US 92949700	A	19920923	199437	B

Priority Applications (No Type Date): JP 91245705 A 19910925
Patent Details:

Patent No	Kind	Lan	Pg	Main IPC	Filing Notes
US 5349295	A		13	G01R-033/20	

Abstract (Basic): US 5349295 A
The magnetic resonance imaging appts includes a unit for carrying out the **contrast enhanced**-Fourier acquired **steady**-state technique (CE-FAST) extended to **three dimensions**, and an **image reconstruction** unit for **reconstructing** a number of relatively thin slice images on the basis of echo signals from the **three-dimensional** region acquired by the unit.

A weighting unit weights differently the relatively thin slice images obtained by the **image reconstructing** unit, and an adding unit adds slice images obtained by the weighting unit so as to produce a surface anatomy scan image of the **three-dimensional** region. An image display unit displays the surface anatomy image obtained by the adding unit.

USE/ADVANTAGE - Generating **three-dimensional** image of selected **three-dimensional** region of subject under examination on basis of magnetic resonance phenomena exhibited by hydrogen atomic nuclei. Permits high quality surface anatomy scan to be obtained at high speed.

Dwg.1/9
Title Terms: MAGNETIC; RESONANCE; IMAGE; APPARATUS; SUBJECT; SUBJECT; EXAMINATION; PLACE; STATIC; MAGNETIC; FIELD; RF; PULSE; GRADIENT; MAGNETIC; FIELD; ACQUIRE; ECHO; SIGNAL; OBTAIN; IMAGE
Derwent Class: S01; S03; S05
International Patent Class (Main): G01R-033/20
File Segment: EPI
Manual Codes (EPI/S-X): S01-E02A; S03-E07A; S05-D02B1

31/9/3 (Item 3 from file: 350) **Links**
Derwent WPIX
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010025931 **Image available**
WPI Acc No: 1994-293644/**199436**
XRPX Acc No: N94-231063

Fast nuclear magnetic resonance image acquisition with spectrally selective inversion pulse - performing three dimensional fourier transform scan using set of steady state free precession pulse sequences and preceding each series series of pulse sequences to acquire one plane through 3D space

Patent Assignee: GENERAL ELECTRIC CO (GENE)
Inventor: FOO T K
Number of Countries: 001 Number of Patents: 001
Patent Family:

Patent No	Kind	Date	Applicat No	Kind	Date	Week	
US 5347216	A	19940913	US 92902634	A	19920623	199436	B

Priority Applications (No Type Date): US 92902634 A 19920623
Patent Details:

Patent No	Kind	Lan	Pg	Main IPC	Filing Notes
US 5347216	A		11	G01V-003/00	

Abstract (Basic): US 5347216 A

The method comprises performing a **contrast preparation pulse sequence** which includes producing a spectrally selective RF inversion pulse which is tuned to the Larmor frequency of a selected spin species to be suppressed in the **reconstructed image**, performing a SSFP pulse sequence series in which a subset of the set of **steady**-state free precession pulse sequences are performed to acquire a portion of the **NMR** data and

repeating the above steps until all **steady**-state free precession pulse sequences in the set have been performed without any significant recovery period therebetween. The selected spin species is fat or water.

The **NMR** data is a 3 dimensional Fourier Transform data set(3DFT), in which each **steady**-state free precession pulse sequence includes a second magnetic field gradient.

USE/ADVANTAGE - For conducting a scan comprised of a set of **steady**-state free precession pulse sequences in which a magnetic field gradient is stepped through a corresponding set of values to acquire **NMR** data from which an **image** is **reconstructed**. Rapid acquisition of fat suppressed images. Enables, eg, breast lesions to be imaged before the enhancement effect of Gadolinium dissipates and without the strong signal produced by fat. Maximises effect of Gadolinium tumour **contrast** agent.

31/9/5 (Item 5 from file: 350) **Links**
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009057102 **Image available**
WPI Acc No: 1992-184483/**199223**
XRPX Acc No: N92-139229

Measuring NMR in selected region of body for tomography - completing each series of 180 deg. radiation pulses from first to penultimate by HF flip-back pulse

Patent Assignee: BRUKER MEDIZINTECH GMBH (BRUK-N); BRUKER MEDIZINTECHNIK RHEINSTE (BRUK-N)
Inventor: RATZEL D; STROEBEL B; TREIBER E
Number of Countries: 003 Number of Patents: 003
Patent Family:

Patent No	Kind	Date	Applicat No	Kind	Date	Week	
DE 4037381	A	19920527	DE 4037381	A	19901123	199223	B
US 5248942	A	19930928	US 91795510	A	19911121	199340	
DE 4037381	C2	19950309	DE 4037381	A	19901123	199514	

Priority Applications (No Type Date): DE 4037381 A 19901123
Patent Details:

Patent No	Kind	Lan	Pg	Main IPC	Filing Notes
DE 4037381	A		9	G01R-033/54	
US 5248942	A		7	G01R-033/20	
DE 4037381	C2		9	G01N-024/08	

Abstract (Basic): DE 4037381 A

The patient's body for medical examination is subjected to a homogeneous magnetic field and gradient fields and excitation pulses. The body is then irradiated by a series of 180 deg. pulses which, together with the corresp. excitation pulses, form a Carr-Purcell-Gill-Meiboom pulse series. For each excitation several n.m.r. signals in form of a so-called spin-echo are generated.

The duration of the switched-on operation and the strength of the gradient fields are set so that the same phase state of the **magnetic resonance** pertains at the timing of each 180 deg. pulse as at the time point of the previous 180 deg. pulse. A reading gradient is symmetrically switched in w.r.t. time at least during the appearance of the spin echo.

USE/ADVANTAGE - **Two** or **three dimensional** tomography. Shorter repetition times without falsifying image contents by longer relaxation times.

Dwg.1/4

Abstract (Equivalent): DE 4037381 C

A body is exposed to **uniform** magnetic fields and to gradient fields and to a sequence of pulses with an excitation pulse and a 180 deg. pulse. The sequence is terminated by a flip-back pulse whose start coincides with the max. of the spin echo produced by the last 180 deg. pulse.

At least two 180 deg. pulses producing spin echoes are introduced. The duration and strength of the gradient fields are such that the same nuclear spin phase condition exists at each 180 deg. pulse. A read gradient is introduced during a spin echo and at the time of introduction of the flip-back pulse the spin moments forming the spin echo are all in-phase.

USE/ADVANTAGE - Measuring nuclear spin resonance in selected slices of body. Allows shorter repeat times giving acceptable total **measuring** times without falsifying **image** content with long relaxation times.

Dwg.1/4

Abstract (Equivalent): US 5248942 A

The method for measuring NWR involves determining time by relaxing time of the spins. Prior to each excitation a significant quantity of these spins have to return into their equilibrium (z-direction of the homogeneous magnetic field) in order to create a usable signal with the next excitation.

For spins with long relaxation times **T2** this **time** can be reduced by a -90 degrees pulse (12) that coincides with the centre of the last spin echo (9) with appropriate application of the gradient fields. This -90 deg. pulse returns the x-y magnetisation that exists in the x-y plane into the z-direction. The diagnostic relevance can be significantly increased by such a procedure.

USE - In **three dimensional** tomography.

Dwg.1/4

Title Terms: MEASURE; **NMR**; SELECT; REGION; BODY; TOMOGRAPHY; COMPLETE; SERIES; DEGREE; RADIATE; PULSE; FIRST; PENULTIMATE; HF; FLIP; BACK; PULSE

Index Terms/Additional Words: TWO-DIMENSIONAL; THREE-DIMENSIONAL

Derwent Class: P31; S01; S03; S05

International Patent Class (Main): G01N-024/08; G01R-033/20; G01R-033/54

International Patent Class (Additional): A61B-005/055

File Segment: EPI; EngPI

Manual Codes (EPI/S-X): S01-E02A; S01-H05; S03-E07; S05-D02B

31/9/6 (Item 6 from file: 350) **Links**
Derwent WPIX
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008122661 **Image available**
WPI Acc No: 1990-009662/**199002**
XRPX Acc No: N90-007414
Spectral editing of NMR signals produced by metabolites - using two dimensional method for separating signal components produced by desired metabolite molecules
Patent Assignee: GENERAL ELECTRIC CO (GENE)
Inventor: SOTAK C H
Number of Countries: 006 Number of Patents: 002
Patent Family:

Patent No	Kind	Date	Applicat No	Kind	Date	Week	
EP 349894	A	19900110	EP 89111746	A	19890628	199002	B
US 4962357	A	19901009	US 88215979	A	19880707	199043	

Priority Applications (No Type Date): US 88215979 A 19880707
Cited Patents: 3.Jnl.Ref; A3...9128; No-SR.Pub
Patent Details:

Patent No	Kind	Lan	Pg	Main IPC	Filing Notes
EP 349894	A	E	15		

Designated States (Regional): CH DE GB LI NL

Abstract (Basic): EP 349894 A

The appts. produces a nuclear resonance signal by selectively suppressing interfering signals not produced by metabolite molecules. The method comprises applying a polarising magnetic field to the region under examination and applying a radio frequency excitation field pulse. A second radio frequency excitation pulse is applied after a time **period** dependent on the **spin-spin** coupling **constant** of the metabolite molecule. A third radio frequency excitation field pulse is applied after a second period which is a function of the zero quantum modulation frequency of the metabolite molecule.

The pulse sequence is repeated with a series of different second time periods to produce a **two-dimensional** data rray. An **image** is **reconstructed** by performing a **two-dimensional** Fourier transformation of this data array.

USE/ADVANTAGE - In vivo spectroscopy. Allows to suppress signals from uncoupled spin resonances caused by components such as water and lipids.

2/7

Abstract (Equivalent): US 4962357 A

The **NMR** method for acquiring the volume localised, in vivo proton spectra of spin-spin coupled metabolites employs a series of stimulated echo pulse sequences (90-TE/2-90-t1-90-TE/2).

The value of period t1 is different for each of the pulse sequences

in the series, and the **NMR** signals produced by the series of pulse sequences are acquired and digitised to form a **two-dimensional** data array. A **two dimensional** Fourier transformation is performed on this data array to produce an array of data that is employed to generate a contour plot. ADVANTAGE - Enhanced accuracy.

(13pp

Title Terms: SPECTRAL; EDIT; **NMR**; SIGNAL; PRODUCE; METABOLITE; TWO; DIMENSION; METHOD; SEPARATE; SIGNAL; COMPONENT; PRODUCE; METABOLITE; MOLECULAR

Derwent Class: S01; S03; S05

International Patent Class (Additional): G01R-033/46

File Segment: EPI

Manual Codes (EPI/S-X): S01-E; S01-H05; S03-E07; S05-D02X

31/9/7 (Item 7 from file: 350) **Links**
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004150294
WPI Acc No: 1984-295834/**198448**
XRPX Acc No: N84-220534

NMR system for measuring and imaging fluid flow - exciting thin and thick transverse slices by RF pulses at normal to produce NMR signals from tagged nuclei

Patent Assignee: GENERAL ELECTRIC CO (GENE)
Inventor: WEHRLI F W
Number of Countries: 009 Number of Patents: 006
Patent Family:

Patent No	Kind	Date	Applicat No	Kind	Date	Week	
EP 126381	A	19841128	EP 84105241	A	19840509	198448	B
FI 8401445	A	19841119				198519	
US 4532473	A	19850730	US 83495556	A	19830518	198533	
EP 126381	B1	19920715	EP 84105241	A	19840509	199229	
DE 3485809	G	19920820	DE 3485809	A	19840509	199235	
			EP 84105241	A	19840509		
FI 91447	B	19940315	FI 841445	A	19840411	199414	

Priority Applications (No Type Date): US 83495556 A 19830518
Cited Patents: DE 2501794; DE 2928551; DE 3130006
Patent Details:

Patent No	Kind	Lan	Pg	Main IPC	Filing Notes
EP 126381	A	E	29		
Designated States (Regional): CH DE FR GB LI NL SE					
EP 126381	B1	E	34	G01R-033/48	
Designated States (Regional): CH DE FR GB LI NL					
DE 3485809	G			G01R-033/48	Based on patent EP 126381
FI 91447	B			G01N-024/08	patent FI 8401445

Abstract (Basic): EP 126381 A

A sample (100) is situated in a **homogenous** magnetic field (BO) acting in the direction of flow. Nuclear spins, in a first transverse slice (105) of thickness, are first tagged, or saturated, and then excited by the application of a selective 90 degree RF pulse along the horizontal axis to produce a first **NMR** signal.

The **NMR** signal originates from tagged nuclei in the imaging slice (104) and untagged nuclei which have partially or wholly replaced nuclei flowing out of the slice. Thereafter, nuclei are tagged and excited in a second, thicker sample region (106) which extends from the slice (104) in a direction opposite to the fluid flow. The first and second **NMR** signals are utilised to determine the magnitude of nuclear spin flow velocity.

USE - In non-invasively **measuring** and **imaging** blood flow in medical diagnostics. E.G. for multiple angle projection

reconstruction and 2-dimensional Fourier transforms.

1A,B/6

DE 3485809 G

A sample (100) is situated in a **homogenous** magnetic field (BO) acting in the direction of flow. Nuclear spins, in a first transverse slice (105) of thickness, are first tagged, or saturated, and then excited by the application of a selective 90 degree RF pulse along the horizontal axis to produce a first **NMR** signal. The **NMR** signal originates from tagged nuclei in the imaging slice (104) and untagged nuclei which have partially or wholly replaced nuclei flowing out of the slice. Thereafter, nuclei are tagged and excited in a second, thicker sample region (106) which extends from the slice (104) in a direction opposite to the fluid flow. The first and second **NMR** signals are utilised to determine the magnitude of nuclear spin flow velocity. USE - In non-invasively **measuring** and **imaging** blood flow in medical diagnostics. E.G. for multiple angle projection reconstruction and 2-dimensional Fourier transforms.

Abstract (Equivalent): EP 126381 B

A method employing **NMR** for measuring the magnitude of nuclear spin blood flow velocity within a vessel (102) in an **NMR** sample (100) positioned in a substantially **homogenous** magnetic field, characterised by the following steps: a) marking for purposes of identification a plurality of nuclear spins in a slice (104) of said sample (100), including nuclear spins in a portion of said vessel (102) situated in said slice (104); b) exciting a plurality of nuclear spins in said slice (104) to produce a first **NMR** signal (S1) originating substantially from said marked nuclear spins situated in said slice (104) and from unmarked nuclear spins flowing in said vessel (102) into said slice (104) to replace at least some of the marked nuclear spins flowing out of said slice (104); c) marking for purposes of identification a plurality of nuclear spins in a region of said sample (100) which includes at least a part of said vessel (102), said region also including said slice (104) and extending therefrom in a direction opposite to the direction of flow; d) exciting nuclear spins in said slice (104) to produce a second **NMR** signal (S11) originating substantially from marked nuclear spins situated in said slice (104) and from marked nuclear spins flowing in said vessel (102) from said region into said slice (104); and e) utilising said first (S1) and second (S11) **NMR** signals to determine the magnitude of nuclear spin flow velocity in said vessel (102) through said slice (104).

(Dwg. 1/6

Abstract (Equivalent): US 4532473 A

Nuclei in an imaging slice, transaxial, for example, to a direction of fluid flow, are first tagged (saturated or inverted) and then excited to produce a first **NMR** signal. This signal originates from tagged nuclei in the imaging slice and untagged nuclei which have partially or wholly replaced nuclei flowing out of the slice. Nuclei are tagged in a second thicker sample region which includes the imaging slice and extends in a direction opposite to the fluid flow. The nuclei are again excited in the imaging slice.

The **NMR** signal detected is again from the entire imaging slice but is due entirely to tagged nuclei (if the second slice is

selected to have the appropriate thickness) and has a smaller magnitude than the first signal. These signals are useful in measuring the fluid flow velocity. Is useful with multiple-angle projection reconstruction and **two-dimensional** Fourier transform (2DFT) techniques to **reconstruct NMR images** exhibiting flowing nuclei only, e.g. for blood flow.

(12pp

Title Terms: **NMR**; SYSTEM; MEASURE; IMAGE; FLUID; FLOW; EXCITATION; THIN; THICK; TRANSVERSE; SLICE; RF; PULSE; NORMAL; PRODUCE; **NMR**; SIGNAL; TAG; NUCLEUS

Derwent Class: P31; S02; S05

International Patent Class (Main): G01N-024/08; G01R-033/48

International Patent Class (Additional): A61B-005/02; G01F-001/62; G01F-001/716; G01P-005/00; G01R-033/08

File Segment: EPI; EngPI

Manual Codes (EPI/S-X): S02-C01B4; S05-D01B1

32/9/4 (Item 4 from file: 350) **Links**
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011989383 **Image available**
WPI Acc No: 1998-406293/**199835**
XRPX Acc No: N98-317194
Image display method for NMR imaging - involves converting and displaying pixel value based on arbitrary function determined according to pixel value distribution
Patent Assignee: HITACHI MEDICAL CORP (HITR)
Number of Countries: 001 Number of Patents: 001
Patent Family:

Patent No	Kind	Date	Applicat No	Kind	Date	Week	
JP 10165387	A	19980623	JP 96329392	A	19961210	199835	B

Priority Applications (No Type Date): JP 96329392 A 19961210
Patent Details:

Patent No	Kind	Lan	Pg	Main IPC	Filing Notes
JP 10165387	A		9	A61B-005/055	

Abstract (Basic): JP 10165387 A
The method involves performing the **imaging** of the **two dimensional** distribution of the living body tissue. The pixel value distribution of the living body tissue is analysed.
An arbitrary function is optimised, based on the obtained pixel value distribution. The pixel value of the **image** is converted and displayed, based on the optimised arbitrary function.
ADVANTAGE - Improves **contrast** in **image** of living body tissue. Displays inside of blood vessel **uniformly**. Improves pixel value of blood flow.
Dwg.1/4
Title Terms: **IMAGE**; DISPLAY; METHOD; **NMR**; **IMAGE**; CONVERT; DISPLAY; PIXEL; VALUE; BASED; ARBITRARY; FUNCTION; DETERMINE; ACCORD; PIXEL; VALUE; DISTRIBUTE
Derwent Class: P31; S01; S03; S05; T01
International Patent Class (Main): **A61B-005/055**
International Patent Class (Additional): **G01R-033/32**; G06T-005/00; H04N-001/387
File Segment: EPI; EngPI
Manual Codes (EPI/S-X): **S01-E02A2**; **S03-E07A**; **S05-D02B2**; T01-J06A; T01-J10B2

33/9/1 (Item 1 from file: 347) **Links**
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03242848 **CONTRAST MEDIUM CREAM FOR NUCLEAR MAGNETIC RESONANCE PHOTOGRAPHING**

Pub. No.: 02-218348 [JP 2218348 A]
Published: August 31, 1990 (**19900831**)
Inventor: MIURA YOSHIAKI
SHIMIZU KIMIHARU
Applicant: SHIMADZU CORP [000199] (A Japanese Company or Corporation), JP (Japan)
Application No.: 01-040724 [JP 8940724]
Filed: February 21, 1989 (19890221)
International Class: [5] A61B-005/055; A61K-049/00
JAPIO Class: 28.2 (SANITATION -- Medical); 14.4 (ORGANIC CHEMISTRY -- Medicine)
Journal: Section: C, Section No. 779, Vol. 14, No. 526, Pg. 7, November 19, 1990 (19901119)

ABSTRACT
PURPOSE: To sufficiently obtain the **image** information of the skin surface shape by forming the **contrast** medium containing the substance containing at least proton and paramagnetic substance into cream form and applying said cream onto the skin surface of an inspected body.

CONSTITUTION: The **contrast** medium cream is formed by mixing water and the proton-containing substance such as fat and the paramagnetic substance such as gadolinium, and formed to a viscous cream. Therefore, the cream can be applied onto the body skin surface of an inspected body. The paramagnetic substance in the **contrast** medium cream shortens the **relaxation time** of the substance containing proton, and the **contrast** of the **image** of the skin surface of the inspected body applied with the **contrast** medium cream can be intensified by increasing the intensity of the **MRI** signal. Further, the distinct **three- dimensional image** of an inspected part of the inspected body can be obtained from the tomography contour **image** of the inspected body.

33/9/2 (Item 1 from file: 350) **Links**
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014178232 **Image available**
WPI Acc No: 2001-662460/**200176**
Related WPI Acc No: 1995-036006; 1996-424253; 1997-086081; 1997-086219; 1998-285301; 1998-346855; 1998-455911; 1998-494190; 2001-342726; 2001-564330; 2001-646994; 2001-662132; 2002-082276; 2002-215839; 2003-503550; 2003-711560; 2004-346604; 2004-675659; 2004-737039
XRPX Acc No: N01-493532

Aorta and aortic aneurysm imaging method involves administering magnetic resonance contrast agent to artery by intravenous infusion at infusion rate sufficient to provide elevated concentration of contrast agent in artery

Patent Assignee: PRINCE M R (PRIN-I)
Inventor: PRINCE M R
Number of Countries: 001 Number of Patents: 002
Patent Family:

Patent No	Kind	Date	Applicat No	Kind	Date	Week	
US 20010027265	A1	20011004	US 9371970	A	19930607	200176	B
			US 95378384	A	19950125		
			US 95420815	A	19950412		
			US 96715736	A	19960919		
			US 98124262	A	19980729		
			US 2001828428	A	20010407		
US 6662038	B2	20031209	US 9371970	A	19930607	200405	
			US 95378384	A	19950125		
			US 95420815	A	19950412		
			US 96715736	A	19960919		
			US 98124262	A	19980729		
			US 2001828428	A	20010407		

Abstract (Basic): US 20010027265 A1

NOVELTY - A sagittal T1 **weighted sequence** and dynamic **3D** volume sequences are performed to locate aneurysm and to **image** aorta and extent of aorta aneurysm respectively. Gadolinium compound is administered to patient by intravenous infusion at infusion rate sufficient to provide elevated concentration of the **contrast** agent in the artery during collecting **image** data representative of center of k-space.

DETAILED DESCRIPTION - INDEPENDENT CLAIMS are also included for the following:

(a) Method of **imaging** portions of aorta or its major branches in a patient;

(b) Method of **imaging** aorta or renal arteries of a patient.

USE - For examining, detecting, diagnosing and treating arterial diseases and injuries including aneurysmal disease.

ADVANTAGE - Eliminates risks associated with arterial catheterization by intravenous injection. The high level of arterial

contrasts permits **imaging** of arterial lumen directly.

DESCRIPTION OF DRAWING(S) - The figure shows the longitudinal **relaxation time** (T1) of blood as a function of injection **imaging time** and total paramagnetic **contrast** dose for a compound with a relaxivity of 4.5/millimolar-second.

pp; 31 DwgNo 1/10

Title Terms: AORTA; AORTA; ANEURYSM; **IMAGE**; METHOD; ADMINISTER; MAGNETIC; RESONANCE; **CONTRAST**; AGENT; ARTERY; INTRAVENOUS; INFUSION; INFUSION; RATE; SUFFICIENT; ELEVATE; CONCENTRATE; **CONTRAST**; AGENT; ARTERY

Derwent Class: P31; P34; S05

International Patent Class (Main): A61B-005/055; A61N-002/00

International Patent Class (Additional): A61B-017/52

File Segment: EPI; EngPI

Manual Codes (EPI/S-X): S05-D02B2; S05-D02B3

33/9/4 (Item 3 from file: 350) **Links**
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013556769
WPI Acc No: 2001-040976/**200105**
XRAM Acc No: C01-011876
XRPX Acc No: N01-030555

Acquiring magnetic resonance data from sample comprising applying radio frequency pulse to sample in magnetic field and analyzing at set time intervals

Patent Assignee: UNIV COLUMBIA NEW YORK (UYCO)
Inventor: KATZ J; KLINE R P; WU E X
Number of Countries: 090 Number of Patents: 003
Patent Family:

Patent No	Kind	Date	Applicat No	Kind	Date	Week	
WO 200069336	A1	20001123	WO 2000US13186	A	20000512	200105	B
AU 200051330	A	20001205	AU 200051330	A	20000512	200113	
US 6681132	B1	20040120	US 99317068	A	19990513	200407	

Priority Applications (No Type Date): US 99317068 A 19990513
Patent Details:

Patent No	Kind	Lan	Pg	Main IPC	Filing Notes
WO 200069336	A1	E	99	A61B-005/055	
AU 200051330	A				Based on patent WO 200069336
US 6681132	B1			A61B-005/055	

Designated States (National): AE AL AM AT AU AZ BA BB BG BR BY CA CH CN CR CU CZ DE DK DM EE ES FI GB GD GE GH GM HR HU ID IL IN IS JP KE KG KP KR KZ LC LK LR LS LT LU LV MA MD MG MK MN MW MX NO NZ PL PT RO RU SD SE SG SI SK SL TJ TM TR TT TZ UA UG UZ VN YU ZA ZW
Designated States (Regional): AT BE CH CY DE DK EA ES FI FR GB GH GM GR IE IT KE LS LU MC MW NL OA PT SD SE SL SZ TZ UG ZW

Abstract (Basic): WO 200069336 A1

NOVELTY - Acquiring **magnetic resonance** data from a sample comprising applying a radio frequency (RF) pulse to a sample in a magnetic field, and analyzing at set time intervals, is new.

DETAILED DESCRIPTION - Acquiring **magnetic resonance** data from a sample comprising applying a radio frequency (RF) pulse to a sample in a magnetic field, and analyzing at set time intervals, is new. The method comprises:

(a) applying a RF pulse to a sample in a magnetic field, causing alignment of nucleic populations within the sample;

(b) applying a RF pulse at a set time interval (T1), causing a measurable **signal** in the **transverse** plane;

(c) suppressing a nuclei population in the sample by selecting (T1), or by applying a multiple quantum filter;

(d) applying **image** encoding for **signal** acquisition of the sample as in (a);

(e) detecting and analyzing the output **signal** to obtain a

weighted image;

(f) applying the magnetic field to the sample in (a);

(g) detecting and analyzing the output signal to obtain an unweighted **image**; and

(h) comparing the **weighted** and unweighted **images**.

INDEPENDENT CLAIMS are also included for the following:

(1) determining the effectiveness of chemotherapy, comprising:

(a) administering a dose of antineoplastic agent to a subject prior to surgical removal of a cancerous tumor;

(b) applying a method as in (A) to the subject; and

(c) using the data obtained by applying a method as in (A) to determine if the antineoplastic agent has altered the nuclei populations in the subject;

(2) detecting and characterizing tumors or for determining cell death in a subject comprising:

(a) applying a method as in (A) to the subject;

(b) using the data obtained by applying a method as in (A) to determine the nuclei populations in the subject.

USE - For determining the effectiveness of chemotherapy with an antineoplastic agent in the treatment of cancerous tumor, e.g. prostate or breast cancer, for detecting and characterizing tumors in a subject especially a human, and for determining cell death in a subject (claimed).

ADVANTAGE - The methods can be used to derive additional **images** which represent average estimated spatial profiles of important pathophysiological parameters. They can optimize **magnetic resonance imaging** for enhancing intracellular sodium and diagnosing tumors and their response to chemotherapy.

pp; 99 DwgNo 0/14

Technology Focus:

TECHNOLOGY FOCUS - BIOTECHNOLOGY - Preferred Method: The magnetic field strength is 1-15, preferably 1-5, especially 4.23 tesla. The magnetic coil is tuned for sodium, or multiple tuned optionally without using surface coils. The radio frequency pulse is 180 degrees followed by 90 degrees. Alternatively, it is selective, nonselective, single, composite, sinc, sech or tyco. The data is **two** or **three dimensional**, may be acquired with projection reconstructions, pin-echo or gradient echo. The set time (T1) is the time which suppresses detection of a population of nuclei. The suppression comprises minimization of the signal of a population of nuclei, or the use of phantoms. T1 comprises the longitudinal **relaxation time** of the suppressed nuclei, and T1 is preferably 25 ms. The **weighted** and unweighted **images** are compared pixel to pixel, or region to region. Alternatively, the comparison is algebraic.

Extension Abstract:

EXAMPLE - A murine myocyte line (AT-1) in non-athymic mice was propagated, since these mice could be subject to multiple **imaging** sessions. Single quantum and triple quantum (TQ) **images** of a large AT-1 tumor were acquired and the higher signal intensity in tumor compared to normal tissue in the Na **images** was noted. However, there is a higher **contrast** between tumor and normal tissue in the TQ **image** compared to the SQ **image**

due to the higher sensitivity of TQ **nuclear magnetic resonance** (**NMR**) to (Nai). After preliminary studies, experiments were performed where proton, Na, SQ and Na TQ **images** and line profiles were acquired at baseline and following bolus intravenous (i.v.) injection of chemotherapy. **Imaging** results for a LNCaP tumor in vivo, both at baseline and 18 hours after i.v. injection of 1 mg of taxotere in the femoral vein were examined. While the SQ line profile did not significantly vary, there was an increase in the TQ line profiles following chemotherapy. These results indicate that a change in (Nai) due to chemotherapy is detectable by TQ **imaging**, but not SQ **imaging**, and illustrate the potential of using the advanced **magnetic resonance imaging** (**MRI**) techniques to follow chemotherapeutic efficacy in vivo. Tumor propagated from the AT-1 myocyte cell line was used for an additional MR confirmation of the approach. A single tumor was removed and finely minced, then split in half and resuspended in 2 50 ml tubes filled with oxygenated media. TQ filtered sodium MR spectroscopy was used with a Bruker 400 (RTM). After control spectra were acquired, the tissue was resuspended in fresh media. To one tube was added lonidamine and doxorubicin (adriamycin). At 6 hours, the 2 tubes were again examined and the treated tumor gave a clearly higher signal, indicating sodium elevation.

Title Terms: ACQUIRE; MAGNETIC; RESONANCE; DATA; SAMPLE; COMPRISE; APPLY; RADIO; FREQUENCY; PULSE; SAMPLE; MAGNETIC; FIELD; SET; TIME; INTERVAL
Derwent Class: B04; D16; P31; S05
International Patent Class (Main): A61B-005/055
File Segment: CPI; EPI; EngPI
Manual Codes (CPI/A-N): B11-C08A; B12-K04A1; D05-H09
Manual Codes (EPI/S-X): S05-D02B2
Chemical Fragment Codes (M6):
01 M905 Q233 R515 R521 R528 R627 R639

33/9/5 (Item 4 from file: 350) **Links**
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009609263
WPI Acc No: 1993-302811/**199338**
XRPX Acc No: N93-232885

Three-dimensional magnetic resonance imaging method - initiating some of preparation - acquisition - recovery sequences cycles by trigger signal, with sequence being synchronised with external temporal event

Patent Assignee: UNIV VIRGINIA PATENTS FOUND (UYVI-N)
Inventor: BROOKEMAN J R; MUGLER J P
Number of Countries: 001 Number of Patents: 001
Patent Family:

Patent No	Kind	Date	Applicat No	Kind	Date	Week	
US 5245282	A	19930914	US 91723230	A	19910628	199338	B

Priority Applications (No Type Date): US 91723230 A 19910628
Patent Details:

Patent No	Kind	Lan	Pg	Main IPC	Filing Notes
US 5245282	A		20	G01R-033/20	

Abstract (Basic): US 5245282 A

A magnetisation **preparation period** is provided in which a series of RF pulses, gradient field pulses, and time delays are applied to encode the desired **contrast** properties in the form of longitudinal magnetisation. In a data acquisition period, the period includes two repetitions of a gradient echo sequence to acquire data for a fraction of k-space.

A magnetisation recovery **period** allows **relaxation** before the start of the next sequence cycle. The first three steps are repeated until a predetermined k-space volume is sampled. Some of the RF pulses are spatially or chemically non-selective.

ADVANTAGE - Improves **imaging** capabilities in clinical areas eg brain **imaging**, **3D** abdominal **imaging**.

Dwg.2/6

Title Terms: THREE; DIMENSION; MAGNETIC; RESONANCE; **IMAGE**; METHOD; INITIATE; PREPARATION; ACQUIRE; RECOVER; SEQUENCE; CYCLE; TRIGGER; SIGNAL ; SEQUENCE; SYNCHRONISATION; EXTERNAL; TEMPORAL; EVENT
Derwent Class: S01; S03; S05
International Patent Class (Main): G01R-033/20
File Segment: EPI
Manual Codes (EPI/S-X): S01-E02A; S01-H05; S03-E07A; S05-D02B2

33/9/10 (Item 9 from file: 350) **Links**
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004150817
WPI Acc No: 1984-296356/**198448**
XRPX Acc No: N84-220884

NMR imaging for medical diagnosis - processing stored frequency domain data from succession of projections into data representative of nuclear spin density distribution

Patent Assignee: GENERAL ELECTRIC CO (GENE)
Inventor: BOTTOMLEY P A; EDELSTEIN W A
Number of Countries: 004 Number of Patents: 005
Patent Family:

Patent No	Kind	Date	Applicat No	Kind	Date	Week	
GB 2140569	A	19841128	GB 8411665	A	19840508	198448	B
FR 2546642	A	19841130				198503	
US 4521733	A	19850604	US 83497358	A	19830523	198525	
GB 2140569	B	19870930				198739	
IL 71831	A	19871130				198803	

Priority Applications (No Type Date): US 83497358 A 19830523
Patent Details:

Patent No	Kind	Lan	Pg	Main IPC	Filing Notes
GB 2140569	A		18		

Abstract (Basic): GB 2140569 A

The **imaging** method is based on a Carr-Purcell-Meiboom-Gill RF pulse sequence and pulsed magnetic field gradients applied to both multiple angle projection **imaging** techniques, and to the **two-dimensional** Fourier transform or spin warm **imaging** techniques. Multiple spin echoes are induced by a repetitive sequence of phase alternated 180 deg. non-selective pulses.

The resulting spin echoes are used to provide improvements in the pixel signal to noise ratio, and/or to generate **images** which reflect the transverse **relaxation time**. The method is partic. useful when directed to the detection and localisation of various disease states of biological tissue, which exhibit altered relaxation times indicative of changes at the molecular level.

0/9

Abstract (Equivalent): GB 2140569 B

A method of generating **NMR image** data using multiple spin echo pulse sequences and multiple angle projections for producing **images** having an improved **signal** to noise ratio, comprising: (a) selectively exciting nuclear spins within a planar slab of a sample and then applying a series of 180 deg. nonselective radio frequency pulses of alternating phase to said sample at spaced time intervals to produce a corresponding series of m spin echo signals in the intervlas following said 180 deg. pulses, each spin echo having associated signal to noise ratio; (b) said selecting and applying steps

being repeatedly performed for a succession of projections with distinct **imaging magnetic** field gradients being employed for each of said succession of projections: (c) converting each fo said series of spin echo signals in step (a) into a time series fo discrete values, selectively reversing the time sequence of alternating ones of the said series of values and averaging temporally corresponding points of said time series to produce an average time series of values representative of all of said spin echoes whereby the signal to noise ratio of said signal is improved by a factor dependent on the number m of distinct spin echoes in said series of spin echo signals; (d) transforming said average time series of values, derived from said m spin echo signals, into frequency domain data representative of **NMR** spin density data for predetermined spatial projections through said sample, and storing said frequency domain data; (e) processing said stored frequency domain data from said succession of projections into data representative of nuclear spin density distribution within said planar slab.

Abstract (Equivalent): US 4521733 A

The methods are based on a Carr-Purcell-Meiboom-Gill (CPMG) RF pulse sequence and pulsed magnetic field gradients applied to both multiple angle projection (MAP) **imaging** techniques, and to the **two-dimensional** Fourier transform (2DFT) or spin warp **imaging** techniques. The methods involve the generation of multiple spin echoes induced by a repetitive sequence of phase laternated 180 deg. nonselective pulses.

The resulting spin echoes are used to provide substantive improvements in the pixel signal to noise ratio, and/or to generate **images** which reflect the **transverse relaxation time T2**.

USE - **Imaging** methods are partic. useful when directed to the detection and localization of various disease states of biological tissue, which exhibit altered T2 relaxation times indicative of changes at the molecular level.

(17pp

Title Terms: **NMR**; **IMAGE**; MEDICAL; DIAGNOSE; PROCESS; STORAGE; FREQUENCY; DOMAIN; DATA; SUCCESSION; PROJECT; DATA; REPRESENT; NUCLEAR; SPIN; DENSITY; DISTRIBUTE

Index Terms/Additional Words: **MAGNETIC**; **RESONANCE**

Derwent Class: P31; P84; S03; S05

International Patent Class (Additional): A61B-005/05; G01N-024/08; G01R-033/08; G03X-000/00

File Segment: EPI; EngPI

Manual Codes (EPI/S-X): S03-E07; S05-D02X

34/9/1 (Item 1 from file: 350) **Links**
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014163700 **Image available**
WPI Acc No: 2001-647928/**200174**
XRPX Acc No: N01-484166

Nuclear magnetic resonance imaging, involves arranging samples in k-space along trajectory in rectangular grid by interpolating samples

Patent Assignee: SIEMENS AG (SIEI)
Inventor: HEID O
Number of Countries: 003 Number of Patents: 004
Patent Family:

Patent No	Kind	Date	Applicat No	Kind	Date	Week	
US 20010026157	A1	20011004	US 2001824337	A	20010402	200174	B
DE 10016234	A1	20011011	DE 1016234	A	20000331	200174	
JP 2001292980	A	20011023	JP 200193583	A	20010328	200202	
US 6486670	B2	20021126	US 2001824337	A	20010402	200281	

Priority Applications (No Type Date): DE 1016234 A 20000331
Patent Details:

Patent No	Kind	Lan	Pg	Main IPC	Filing Notes
US 20010026157	A1		5	G01V-003/00	
DE 10016234	A1			G01R-033/54	
JP 2001292980	A		4	A61B-005/055	
US 6486670	B2			G01V-003/00	

Abstract (Basic): US 20010026157 A1

NOVELTY - A magnetic resonance signal is obtained by activating magnetic field whose gradient direction is changed to produce k-space trajectory proceeding on irregular grid. The signals are sampled at variable rate and digitized. The samples (4) are arranged into k-space along trajectory (2) in a rectangular grid by interpolating samples and Fourier transformation is done to generate image data.

USE - For imaging with nuclear magnetic resonance.

ADVANTAGE - **Reconstruction** of **image** data from magnetic resonance signals is efficiently performed by interpolating samples arranged into k-space along trajectory proceeding on irregular grid.

DESCRIPTION OF DRAWING(S) - The figure shows a diagram of helical **2D** k-space trajectory with **uniform** sampling point density.

Trajectory (2)
Sample (4)
pp; 5 DwgNo 1/2

Title Terms: NUCLEAR; MAGNETIC; RESONANCE; IMAGE; ARRANGE; SAMPLE; SPACE; TRAJECTORY; RECTANGLE; GRID; INTERPOLATION; SAMPLE
Derwent Class: S01; S03
International Patent Class (Main): **A61B-005/055**; **G01R-033/54**;

34/9/3 (Item 3 from file: 350) **Links**
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012482304 **Image available**
WPI Acc No: 1999-288412/**199927**
XRPX Acc No: N99-215343

Object temperature distribution determination

Patent Assignee: KONINK PHILIPS ELECTRONICS NV (PHIG); PHILIPS AB (PHIG); US PHILIPS CORP (PHIG)
Inventor: SMINK J; VAN VAALS J J
Number of Countries: 020 Number of Patents: 004
Patent Family:

Patent No	Kind	Date	Applicat No	Kind	Date	Week	
WO 9921024	A1	19990429	WO 98IB1405	A	19980911	199927	B
EP 944841	A1	19990929	EP 98939817	A	19980911	199945	
			WO 98IB1405	A	19980911		
US 6064206	A	20000516	US 98173215	A	19981015	200031	
JP 2001505811	W	20010508	WO 98IB1405	A	19980911	200131	
			JP 99523545	A	19980911		

Priority Applications (No Type Date): EP 97203210 A 19971016
Patent Details:

Patent No	Kind	Lan	Pg	Main IPC	Filing Notes
WO 9921024	A1	E	23	G01R-033/48	
Designated States (National): JP					
Designated States (Regional): AT BE CH CY DE DK ES FI FR GB GR IE IT LU MC NL PT SE					
EP 944841	A1	E		G01R-033/48	Based on patent WO 9921024
Designated States (Regional): DE FR GB NL					
US 6064206	A			G01V-003/00	
JP 2001505811	W		24	A61B-005/055	Based on patent WO 9921024

Abstract (Basic): WO 9921024 A1

NOVELTY - The method determines temperature distribution in part of an object, arranged in a substantially **uniform**, **steady** magnetic field, by means of magnetic resonance.

DETAILED DESCRIPTION - The method of determining the temperature distribution involves the determination of a reference of the object, for example a part of the human body, and a phase image of the human body. Subsequently, the temperature distribution is determined from phase differences between the values of pixels of the phase image and the values of corresponding pixels of a predetermined reference phase image. In order to counteract errors in the temperature distribution which are caused by motion of the object, **navigator pulse sequences** are generated so as to measure **navigator signals** prior to the measurement of magnetic resonance signals from which the reference image and the phase **image** are **reconstructed**. Subsequently, a correction for correction of the temperature distribution is derived from the **navigator**

signals.

USE - The method is used in determining a temperature distribution in part of the human body such as a slice of the body containing a tumor which is being destroyed by heating beyond a limit temperature.

ADVANTAGE - The accurate temperature distribution determination enables damage to other tissue of the body to be minimized.

DESCRIPTION OF DRAWING(S) - The figure shows a magnetic resonance device which includes an ultrasonic source.

pp; 23 DwgNo 5/5

Title Terms: OBJECT; TEMPERATURE; DISTRIBUTE; DETERMINE
Derwent Class: P31; S01; S03; S05; T01
International Patent Class (Main): **A61B-005/055**; **G01R-033/48**; **G01V-003/00**
International Patent Class (Additional): **G01R-033/567**
File Segment: EPI; EngPI
Manual Codes (EPI/S-X): S01-E02A2A; S01-H01A; **S01-H05**; S01-H07; S03-B01C; S03-B01E9; S03-B01H5; **S03-E07A**; **S05-D02B2**; T01-J06A; T01-J10B1

34/9/4 (Item 4 from file: 350) **Links**
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012151967 **Image available**
WPI Acc No: 1998-568879/**199848**
XRPX Acc No: N98-442545

Magnetic resonance method for imaging object placed in steady magnetic field - determines corrected phase for measured navigator MR signal from measuring point for which modulus of measured MR signal is smaller than threshold value from phases of measured MR signals from different reference measuring points

Patent Assignee: KONINK PHILIPS ELECTRONICS NV (PHIG); PHILIPS NORDEN AB (PHIG); US PHILIPS CORP (PHIG)
Inventor: VAN DEN BRINK J S; VAN MUISWINKEL A M C
Number of Countries: 019 Number of Patents: 004
Patent Family:

Patent No	Kind	Date	Applicat No	Kind	Date	Week	
WO 9847015	A1	19981022	WO 98IB417	A	19980323	199848	B
EP 910804	A1	19990428	EP 98907116	A	19980323	199921	
			WO 98IB417	A	19980323		
US 6076006	A	20000613	US 9857500	A	19980409	200035	
JP 2000512533	W	20000926	JP 98529367	A	19980323	200051	
			WO 98IB417	A	19980323		

Priority Applications (No Type Date): EP 97201136 A 19970417
Patent Details:

Patent No	Kind	Lan	Pg	Main IPC	Filing Notes
WO 9847015	A1	E	22	G01R-033/563	
Designated States (National): JP					
Designated States (Regional): AT BE CH DE DK ES FI FR GB GR IE IT LU MC NL PT SE					
EP 910804	A1	E		G01R-033/563	Based on patent WO 9847015
Designated States (Regional): DE FR GB					
US 6076006	A			A61B-005/055	
JP 2000512533	W		21	A61B-005/055	Based on patent WO 9847015

Abstract (Basic): WO 9847015 A

The method creates excitation of spins in part of object, and measures the MR signals along a predetermined trajectory containing several lines in k space by applying a read gradient and other gradients. A navigator gradient is applied to achieve diffusion sensitivity of the MR signal.

Phase corrections are determined from phases and moduli of the **navigator** MR **signals** to correct the measured MR signals and an image of part of the object is determined from the corrected MR signals. A corrected phase (fig 3) is determined for a measured **navigator** MR **signal** from a measuring point for which the modulus of the measured MR signal is smaller than a threshold value from the phases of the measured MR signals from different reference

measuring points for which the moduli of the measured **navigator** MR **signal** exceed the threshold value.

USE - For use in medical diagnostics to acquire MR images of difference phenomena in tissue of part of body, for example, brian of human or animal.

ADVANTAGE - Counteracts strip shaped artefacts which occur at areas in **reconstructed image** corresponding to regions in brain which contain large quantity of cerebrospinal fluid.

Dwg.3/6

Title Terms: MAGNETIC; RESONANCE; METHOD; IMAGE; OBJECT; PLACE; **STEADY**; MAGNETIC; FIELD; DETERMINE; CORRECT; PHASE; MEASURE; NAVIGATION; SIGNAL; MEASURE; POINT; MODULUS; MEASURE; SIGNAL; SMALLER; THRESHOLD; VALUE; PHASE; MEASURE; SIGNAL; REFERENCE; MEASURE; POINT

Derwent Class: P31; S01; S03; S05

International Patent Class (Main): **A61B-005/055**; **G01R-033/563**

International Patent Class (Additional): **G01R-033/54**; **G01R-033/567**

File Segment: EPI; EngPI

Manual Codes (EPI/S-X): **S01-E02A2**; **S03-E07A**; **S05-D02B**

31/9/4 (Item 4 from file: 350) **Links**
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009474830 **Image available**
WPI Acc No: 1993-168365/**199321**
XRPX Acc No: N93-128867

Nuclear spin tomography for diagnosis of body - using incremental differences between layer selection frequencies and uniform distribution of phase encoding steps

Patent Assignee: HENNIG J (HENN-I)
Inventor: HENNIG J
Number of Countries: 004 Number of Patents: 006
Patent Family:

Patent No	Kind	Date	Applicat No	Kind	Date	Week	
DE 4137217	A1	19930519	DE 4137217	A	19911113	199321	B
GB 2261954	A	19930602	GB 9223661	A	19921111	199322	
DE 4137217	C2	19931007	DE 4137217	A	19911113	199340	
US 5298862	A	19940329	US 92974395	A	19921110	199412	
GB 2261954	B	19950712	GB 9223661	A	19921111	199531	
JP 3282684	B2	20020520	JP 92328513	A	19921113	200236	

Priority Applications (No Type Date): DE 4137217 A 19911113
Patent Details:

Patent No	Kind	Lan	Pg	Main IPC	Filing Notes
DE 4137217	A1		20	G01N-024/08	
GB 2261954	A		19	G01R-033/48	
DE 4137217	C2		13	G01N-024/08	
US 5298862	A		15	G01V-003/00	
GB 2261954	B		1	G01R-033/54	
JP 3282684	B2		9	A61B-005/055	Previous Publ. patent JP 5269095

Abstract (Basic): DE 4137217 A

The nuclear spin tomography method involves layer-selective **two-dimensional** Fourier transformation using mutually perpendicular selection, phase encoding and reading gradients and HF pulses. The pulses have a stimulation profile whereby the base frequency differs by a frequency corresp. to the centre separation of adjacent layers.

The layer selection frequencies for two phase encoding steps in the same layer differ by an increment so that the distribution of phase encoding steps over the entire measurement vol. is approximately **uniform**. Full data are made available for **reconstruction** of **images** within partial vol. using overlapping layers.

ADVANTAGE - Continuous detection of measurement vol. can be achieved with diagnostic quality **contrast** using slow **imaging** technique, e.g. spin-echo method.

Dwg.1/13

Abstract (Equivalent): DE 4137217 C

The method of measuring **nuclear magnetic**

resonance involves subjecting a body to a **homogenous** magnetic field, a section gradient and a selective HF pulse. A phase coding gradient, a reading gradient and the selection gradient are arranged at right angles to each other.

The layer selection frequencies for the recording of two phase coding steps in the same layer are separated by a frequency increment which is small w.r.t. the difference in frequency between layers. The phase coding involves the single use of the phase code gradient.

ADVANTAGE - Even when slow recording techniques are used, e.g. spin echo methods, gap-free detection of measured volume is achieved with good **contrast**.

je

Dwg.1/13

Abstract (Equivalent): GB 2261954 B

The nuclear spin tomography method involves layer-selective **two-dimensional** Fourier transformation using mutually perpendicular selection, phase encoding and reading gradients and HF pulses. The pulses have a stimulation profile whereby the base frequency differs by a frequency corresp. to the centre separation of adjacent layers.

The layer selection frequencies for two phase encoding steps in the same layer differ by an increment so that the distribution of phase encoding steps over the entire measurement vol. is approximately **uniform**. Full data are made available for **reconstruction** of **images** within partial vol. using overlapping layers.

ADVANTAGE - Continuous detection of measurement vol. can be achieved with diagnostic quality **contrast** using slow **imaging** technique, e.g. spin-echo method.

(Dwg.1/14)

GB2261954 A method of measuring **nuclear magnetic resonance** in selected areas of a body in order to present images of body cross-sections by means of a slice-selective **two-dimensional** Fourier-transformation process, wherein the body is in a homogeneous magnetic field, exposed to a selection gradient and excited by a selective RF-pulse, wherein further a time-limited phase encoding gradient is applied and finally by means of a read gradient at least one nuclear resonance signal is generated in the form of at least one so-called echo, wherein the selection gradient, the phase encoding gradient and the read gradient are arranged rectangularly or at right angles with respect to one another, wherein RF-pulses have a high frequency excitation profile, of which the base frequencies of the high frequency (= slice selection frequency) is varied in such a manner that different slices are excited by RF-pulses in cooperation with the selection gradient, and wherein the amplitude and/or duration of the phase encoding gradient is varied, wherein the slice selection frequencies for the recording of at least two phase encoding steps or groups of phase encoding steps and at most all phase encoding steps, which are allocated essentially to the same slice, differ by a frequency increment, wherein the allocation of the phase encoding steps to the excitation frequencies in each case is effected such that a distribution of phase encoding steps across the measuring volume is achieved, and layers or slices which belong to a complete recording of the entire volume of the body area overlap one another in such a manner

that, within a random partial volume which lies within the measuring volume and can be varied almost continuously, and has a thickness corresponding to delta f + Delta f, where Delta f corresponds to the layer distance and delta f represents the thickness of a selected layer or slice according to the bandwidth of the selective pulses, a complete set of data is given for the **reconstruction** of an **image** from this partial volume by means of the **two-dimensional** Fourier-transformation.

(Dwg.2

Abstract (Equivalent): US 5298862 A

The **nuclear magnetic** spin **resonance** measurement method involves applying a time-limited phase encoding gradient and a read gradient to generate at least one nuclear resonance signal by gradient inversion in the form of at least one so-called gradient echo. The selection gradient, the phase encoding gradient, and the read gradient are arranged orthogonally with respect to one another. The RF-pulses have a HF excitation profile, of which the base frequencies of the high frequency differ by a value deltaf corresponding to the distance between the centres of adjacent layers or slices.

Different slices are excited by RF-pulses in cooperation with the selection gradient, and the amplitude and/or duration of the phase encoding gradient is varied. Layers or slices which belong to a complete recording of the entire volume of the body area overlap one another in such a manner that within a random partial volume which: lies within the measuring volume, can be varied almost continuously, and has a thickness corresponding to deltaf+deltaf, where deltaf represents the thickness of a selected layer or slice according to the bandwidth of the selective pulses. The method involves choosing at least two high-frequency excitation profiles whose central frequencies differ from each other by a frequency increment which is less than deltaf. where deltaf corresponds to the layer distance. At least two phase encoding gradient steps are selected and assigned to the two high frequency excitation profiles to generate phase encoding steps of one common image slice.

ADVANTAGE - Complete scanning of measurement volume with slow recording to maintain **image contrast**.

Dwg.1/14

Title Terms: NUCLEAR; SPIN; TOMOGRAPHY; DIAGNOSE; BODY; INCREMENT; DIFFER; LAYER; SELECT; FREQUENCY; **UNIFORM**; DISTRIBUTE; PHASE; ENCODE; STEP

Index Terms/Additional Words: multislice; spin; echo

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Manual Codes (EPI/S-X): S03-E07; S05-D02B2